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## A STUDY OF A NESTING OF MAGNOLIA WARBLERS (DENDROICA MAGNOLIA).

BY MARGARET MORSE NICE.

It had been my chief ornithological ambition during the summer of 1925 to discover the nest of a Magnolia Warbler. And when my wish came true, watching the little family grew to be my main occupation in life. It was a never-to-be-forgotten experience—the long hours by the nest in the juniper, recording the doings of the exquisite little birds and listening to the marvelous song of the Hermit Thrush.

Grey Rocks, in Pelham, a hill town in central Massachusetts, is a fascinating place for the nature lover. It is a hill top (700 feet above sea level) from which a wide view of the Connecticut Valley may be seen, bounded on the south by the Holyoke Range, on the north by Mount Toby and Sugar Loaf, with the Berkshire Hills lying to the west. The hilltop itself is rendered picturesque by junipers and cedars; there are also white and pitch pines, grey birches, maples and oaks. The surrounding woodland is largely made up of white pines and hemlocks to the west, and hardwoods to the south and east. In the woods there are rushing brooks, ferns, wild flowers and many kinds of animals: chipmunks, red, grey and flying squirrels, porcupines, foxes and deer. There is only one pest—mosquitoes, for we have no chiggers, wood ticks, black flies, nor English Sparrows.

The avifauna belongs to the Transition Zone with a marked Canadian element. Some of the most characteristic songsters are the Whip-poor-will, Phoebe, Field Sparrow, Chewink, Scarlet Tanager, Red-eyed Vireo, and in the western woods the Solitary Vireo. But the glory of Grey Rocks lies in its thrushes and warblers. Ovenbirds and Maryland Yellow-throats are abundant and insistent; the Black and White, Nashville, Myrtle, Magnolia, and Black-throated Green Warblers are constantly heard near my mothers' house on the hilltop; the Chestnut-sided abounds in the cut-over land to the east; the Black-throated Blue, and Blackburnian nest in the hemlock woods to the west and one or two pairs of Canada Warblers are to be found in the deep woods. Veeries sing from the swamps to the south, while on

the hilltop we are blessed with the wonderful music of the Wood Thrush and Hermit Thrush.

Magnolia Warblers are uncommon in this region; it is only within a mile of Grey Rocks that we have ever seen them during the breeding season. There was but one pair nesting near the house in 1925; this fact was a decided advantage for I always knew that the singing and other activities were those of this particular pair of birds. Moreover, the male had a peculiar song so that I was able to distinguish him even when a visiting Magnolia Warbler appeared upon the scene.

THE SONGS. Instead of the great variety of songs mentioned by some writers<sup>1,2and3</sup>, this particular example of *Dendroica magnolia* had only two songs, each of which was varied at times by the addition of one or two syllables; one of these I called *weechy weech* and the other *sing sweet*.

*Weechy Weech*. This was a plain little song, yet with something of a sweet and lisping character. At close range short preliminary and final syllables were discernible—*Ye weechy weechip*, but at some distance only *weechy weech* could be heard. The accent was always on the last *weech* which was higher than the other notes. This was evidently a shortened form of the most characteristic song of the species; very occasionally this warbler would give the proper song—*Ye weechy weechy weechip*. Two other Magnolia Warblers heard in this region June 30, July 2, 4, and 19 sang the complete form.

*Weechy weech* was primarily a day song, seldom being heard very early (I only once recorded it about 4 A. M.<sup>4</sup> and twice about 5 A. M.) nor was it ever the last song in the evening; rarely occurring after 7 P. M. and only once as late as 7:30 P. M. During the period of incubation it was the perch song, the one proclaiming territory and appeared to be taken as the serious business of life. I never saw this warbler flitting about between *weechy weeches*; at this period he always sat at the top of a tree and devoted himself to his singing. Between each song he gazed about or sometimes preened himself; during the song he looked skyward. His little head seemed such a bright blue in the sunshine, his breast such a brilliant yellow and the black stripes so decorative that he made a lovely sight.

During the feeding of the young, the warbler must have interspersed *weechy weech* between his searches for insects. As I was watching activities at the nest at this time, I never happened to see him

<sup>1</sup>S. E. White, *Auk*, X (1893), 228.

<sup>2</sup>Lynds Jones, *Wilson Bulletin*, XII (1900), 36-38.

<sup>3</sup>F. M. Chapman, *Warblers of North America*, 1907, p. 125.

<sup>4</sup>All hours are given in Eastern Standard time.

while singing this song, but I did hear his *weechy weech* constantly from different points of the compass and often recorded during the space of one minute several songs and the appearance of the bird with an insect in his bill. Another Magnolia Warbler on July 4 (apparently an unmated bird) was singing while flitting about.

When singing steadily, the warbler uttered *weechy weech* from six to seven times a minute, nine songs being the most ever recorded during sixty seconds. In two sets of long series—fifty-seven different minutes on July 9 and seventy-eight on July 14, the average of each series was five songs a minute, varying from one to nine on the earlier date and one to seven on the later. In both cases he was gathering food for the nestlings.

The shortest interval between two songs was five seconds. During his time of leisure when there were eggs in the nest, he often sang at quite a regular rate: on June 29 at 10:30 A. M. the number of seconds between seventeen consecutive songs were 8, 7, 9, 9, 8, 9, 9, 7, 8, 8, 9, 9, 10, 8, 9, 7, 8. An hour later the intervals for two minutes were 7, 8, 9, 7, 8, 9, 10, 10, 8, 8, 9, 8, 8, 10.

*Weechy weech* was sung throughout the day while the eggs were in the nest and also during the first three days after the young hatched. The next four days it was hardly heard at all but it was renewed in full vigor the next day—July 14. After the young left the nest it was sung less and less and was heard for the last time before 6 A. M. on July 23.

*Sing Sweet.* This song usually consisted of two notes but occasionally of three and very rarely of four. It was more musical than *weechy weech*, a somewhat bell like note: it seemed loud for so little a bird. Both syllables were equally accented, but the second was slightly lower than the first; in the *sing sing sweet* variation, the third was slightly lower than the first two. I cannot find any description in the literature that fits this song, nor have I heard other Magnolia Warblers singing it (my experience with this species has been limited.)

This was primarily a feeding song; in every case but one, when I could see the warbler he was flitting about as he sang. The one exception was at 8 A. M., July 17, when I observed him sitting on a branch and preening himself between songs. His favorite place while he sang *sing sweet* was a pitch and white pine grove about 100 yards northwest of the nest; his favorite time was from a half to three-quarters of an hour in the evening. The last *sing sweet* was heard at the following times on fourteen evenings: June 30, 7:37; July 4, 7:35; July 5, 7:46; July 7, 7:37; July 8, 7:40; July 10, 7:48; July 11, 7:45; July 12, 7:49; July 13, 7:37; July 14, 7:42; July 15, 7:30;

July 17, 7:25; July 24, 7:13. It may have been equally characteristic of the early morning but unfortunately I was often asleep at that time; on twelve mornings I recorded this singing very early—from 3:30 to 5:00. During incubation and feeding of the young *sing sweet* was not usual during the day, but it became so after the young had left the nest. It was the only song heard from July 24 to 29; at 6:27 A. M. the last one of the season was recorded.

*Sing sweet* occurred as many as eleven times a minute when the bird was singing steadily, but usually the rate was less. The average of fifty-two minutes recorded at different times was six songs. The intervals between songs was quite variable as the following records on June 30 will show: eight seconds, 13, 6, 10, 5, 5, 25, 13, 7, 7, 14, 9, 10, 5, 15, 10. Another sample of two minutes showed more regularity: 5, 7, 5, 13, 5, 5, 6, 6, 5, 5, 5, 8, 10, 4.

The common form of this song was *sing sweet*, but *sing sing sweet* occurred irregularly: sometimes one or two were interspersed between *sing sweets*, but at other times for a number of minutes there would be a continuous series of the longer forms. Curiously enough when the warbler was thoroughly in the mood of *sing sing sweet*, he usually uttered soft *tit-tits* between each song. Thus one minute's record ran as follows: sss-sss-tt-tt-tt-sss-tt-tt-sss-tt-sss-tt-tt-tt-tt. In one minute there were six *sing sing sweets* and thirteen *tit-tits*; in another four of the former and ten of the latter; while during a third minute nothing but twelve *tit-tits* were heard. One had to be very close in order to detect the *tit-tits*: I ascertained that they did not occur when he was singing *weechy-weech* nor *sing sweet*. Sometimes there were only a few of these little chirps between the *sing sing sweets* and occasionally none at all. This *tit-tit* seemed much the same as the alarm note.

*Weechy weech* and *sing sweet* as a rule indicated different moods—the one typically proclaiming territory and the other a feeding song: usually one would be sung consistently for some time—in the case of *weechy weech* for hours—before changing to the other, and there was nearly always a period of silence between the two kinds of songs. Occasionally, however, especially in the early evening, the warbler might switch back and forth rather freely: thus from 6 to 7 P. M., July 8, he changed five times, the series varying from sixteen to seventy-nine songs of one kind, separated by intervals of silence lasting from two to five minutes except in one case when it was less than a minute. On only two other occasions did I hear a sudden change from one song to the other.

HISTORY OF THE NEST. Magnolia Warblers were first seen and heard singing on Grey Rocks May 19 and 20, 1925, but after that were

absent, so that I had begun to fear that we were not to be favored with a nesting pair on the slope south of the house as we had been in other years. But on June 17 I was rejoiced to hear *weechy weech* in this region and to see the pair of birds. The late date would indicate that a nest had been started elsewhere and had come to grief.

It was *sing sweet* that led to my discovery of the nest. This was a new song to me when I first heard it the evening of June 18; on searching for the singer among the cedars about 200 feet south of the house I saw the female Magnolia Warbler with nesting material in her bill; she appeared twice, both times disappearing into a white pine and once struggling out of a juniper. Her mate continued to sing but did not come into view. The next morning I found a little incompleting nest in the juniper.

The nest was entirely hidden from sight. It was thirty-three inches from the ground in an upright clump of juniper: the only opening was on the north side, from this direction the incubating bird could barely be seen. When finished, the nest was a rather simple affair; it was composed of dried grass stems, lined with white pine needles and black horse hairs. Cedars, white pines and grey birches were the chief trees surrounding the site.

ACTIVITIES DURING INCUBATION. For fear of frightening away the warblers I did not disturb them at all during the process of nest building and visited them but seldom while the eggs were in the nest. These were laid June 22, 23 and 24. Whenever we went to the nest the female stayed on her eggs until nearly touched when she slipped off, flew a few feet and quietly waited. The male never objected to our visits; indeed, I doubt whether he knew of them, for his singing would go on without interruption.

The chief occupation of the male bird during this period was singing, interrupted by occasional sallies to drive off a Myrtle Warbler. *Weechy weech* with sometimes a change to *sing sweet* could be heard nearly all day long from a variety of positions—sometimes as near to the nest as twenty yards but most of the time further away. He usually sat on the very top of different cedars, sometimes facing the nest but often not. I never could see that he had any favorite "singing tree."<sup>5</sup>

On June 23 at 4:30 P. M. I was astonished to hear a curious new note from this bird—a loud shrill *eep*; this was recorded on four other days: July 3, at 7 P. M. for several minutes between two series of *sing sweets*; July 4, at 3:30 P. M.; July 9, when there was no singing in the evening, only some *yeeeps* about 7:20, and July 13 at 8:25 A. M. I

<sup>5</sup>H. Mousley, *Auk*, XXXVI (1919), 339-348.

do not know what state of mind this note indicated; with the exception of the last time the warbler was at his feeding grounds, not near the nest. Twice I recorded it from the female while the young were in the nest; on the second occasion it seemed to be a scolding note—a use for which it appeared eminently fitted.

There was only one special adventure that I witnessed during the period of incubation and that was the visit of a rival. On July 2 at 6 A. M. I heard *weechy weechy weechip* south of the house and hastened out to discover the explanation. There was a new male apparently bent on luring the lady Magnolia from her home. The wrathful husband chased the newcomer around and about, but the impudent stranger would pop up unabashed on top of a juniper bush, singing his song with as much assurance as if he expected an extra two syllables to captivate the lady. This contest continued for ten minutes or so, the warblers answering each other, each singing his own song consistently, until the interloper departed. At 7 o'clock there was only *weechy weech* to be heard and this appeared to have a triumphant ring about it; it was sung practically all morning long, as if the little warbler were guarding his home with redoubled zeal.

Two days later I heard *weechy weechy weechip* from a Magnolia Warbler about 300 yards north of the nest, but I never heard it later in this locality: this might well have been the unmated bird that had caused the excitement on July 2.

ACTIVITIES WHILE THE YOUNG WERE IN THE NEST. At 8:15 A. M. on July 6, the eggs were not hatched, but at 6 P. M. there were three tiny blind orange-red infants, naked except for a few minute tufts of black down.

The next morning at 9:52 I quietly ensconced myself in a chair fifteen feet north of the nest in the shade of a cedar and partly concealed by it. The nest was beautifully protected by the juniper branches so that the sun never shone on it except for a short time each morning. At 9:56 the female appeared, seemed disturbed, flirted her tail, sat in the cedar south of the nest and uttered a gentle *tit*. At 10:03 she went to the young and brooded them without feeding. She left at 10:17, returned at 10:20, fed quickly, waited a moment and then flew away. When she returned, however, she was overcome with timidity and stood about with an insect in her bill, flirting her tail and saying *tit, tit, tit*. Suddenly the male appeared with uplifted tail and quivering wings—apparently in a courting attitude; she flew to a nearby cedar, he followed and both disappeared. In a minute or two

she came to the nest and started to brood; immediately the male appeared on the brim, she slipped off and he followed.

In the hour and a half of observation this first day the female fed the young five times and brooded twice; she was intermittently troubled by my presence. The male paid no attention to me; he did a deal of singing but his activities at the nest were confined to one visit, the result of which was to drive his mate away.

On July 8 the father was beginning to realize the situation for he fed the young seven times in comparison to his mate's thirteen during three hours' observation. Neither bird showed any timidity, even though in the afternoon, driven by lack of shade, I moved to a new position within eight feet of the nest and finally as near as five feet. After this I sat at a distance of eight feet from the nest in the mornings and six feet in the afternoons. Twice a red squirrel worried me by passing through the birches and cedars not far from the nest. From 6 to 7 P. M. the male sang during forty of the sixty minutes, uttering *weechy weech* 102 times, *sing sweet* 133 and *sing sing sweet* seven times.

Both parents usually flew to the cedar south of the nest and then approached from below, almost always using as a ladder a steeple bush that grew just north of the nest. Occasionally, however, they flew directly to the nest either from the cedar south of it or the pine to the west. The juniper branch containing the nest had one large opening to the north and a narrow one to the east; this north entrance was always used by the male for both entrance and exit; in leaving he usually flew off to the northwest but a few times went to the northeast. The female, on the other hand, although at this time always coming to the north entrance and feeding from there, usually left by the east opening; this was the direction she regularly faced while brooding.

The third day the female seemed to have a great deal of cleaning to do inside the nest; she put her head down and rooted around, she rose, she moved about, and finally settled down facing north or west instead of the usual direction east. She brooded after seven of the ten feedings during two and a half hours in the morning; as always she left the nest at the approach of her mate. He seemed to have thoroughly wakened up to his duties, for he fed the young nine times. He sang *weechy weech* 286 times—singing being recorded during fifty-seven of the 150 minutes. Both birds showed slight nervousness at first, uttering the gentle *tit* a number of times before they came to the nest to feed; the female also on one occasion said *ip. ip. ip. eep. eep*—the first time I had heard this note from her. To human ears it seems

well adapted to express disapproval, disgust, rage, while the *tit* was so soft as to be almost inaudible.

From 2:25 to 4:25 the male fed the young twice as often as his mate, although she showed no timidity towards me until the very end. Once they were together at the nest rim, the male fed first and flew away, the female then fed and settled down to brood. At 4:02 the evil squirrel came to a blueberry bush about five yards east of the nest and started to regale himself with the unripe berries; I rose in righteous wrath and frightened him away. The little mother must have been near for at 4:06 when she came with a caterpillar, she seemed timid all at once and could not screw up her courage to come to the north entrance which was so near to me; she shortly solved her problem! coming into the narrow east opening for the first time; she fed a baby, ate an anal sac and settled down to brood facing me.

On July 10 it rained all morning and I heard no singing; during the two afternoon sessions of nest watching the male did not sing at all; in fact the only songs I heard all day were ten *sing sweets* and three *sing sing sweets* from 7:46 to 7:48 in the evening. The parents were equally solicitous in feeding the nestlings.

The miserable squirrel was about again and I resolved to get rid of him if I possibly could, so when I returned at 3:42 I was armed with a shot gun. A curious change had come over my attitude during these days of watching the little brood; before this I had never felt any enmity towards red squirrels; I knew, of course, in an academic way, that they robbed birds' nests but I had never felt called upon to interfere. Reason without emotion leads to no action. But now since my affection for these particular little birds had grown so strong and along with it my apprehension that at each visit I would find a despoiled nest, I had come to hate that squirrel with a perfect hatred.

As I sat there waiting, six feet from the nest (I always had to be near in the afternoon to escape the sun), the female seemed a little troubled. My proximity, added to the fact that I was dressed in khaki instead of my usual green dress, seemed to tax her wits; she did not waste time objecting at me, but she squeezed in between the juniper branches from the south—this being a brand new way of entrance; she fed and then brooded, facing south. This was 4:05; at her next visit—4:23—she came to the north entrance, but at 4:29, 4:32, 4:37, and 4:42 she struggled in from the south, always leaving, however, by the large north opening. As she was peacefully brooding after the last feeding, a rustle in the blueberry bush announced the arrival of the enemy; a few moments later that menace was ended and a great load had been



lifted from my mind. But the poor little mother had darted off as fast as she could at the sound of the terrible report!

The next morning it was plain to be seen that I was eyed with great disfavor by the mother bird after yesterday's experience; she spent almost the whole hour that I watched in chipping at me. She fed only three times and brooded once for two minutes. She was clearly much agitated, she did not hunt for food—except for herself—but sat still most of the time and preened herself to an accompaniment of *tits* at the rate of about thirty a minute. One of her most used perches was in the cedar just behind me, which brought her much nearer to me than if she had been at the nest. I did not record each and every *tit*, but I calculated that in that short space of time I had been reproved with at least a thousand.

The male showed a return to his conduct of July 7 for he seemed bent, strangely enough, on courting his mate. Twice when he saw her he made a curious little squeaky, grating note *kree-ee kree-ee*, in the meantime spreading his wings and tail.

The main features of the sixth day from 9:30 to 11:30 and 3:22 to 4:52, were the entire absence of singing and of brooding, the greater devotion to the young of the male than the female—he feeding twenty times to her eleven—and the increased self-assertiveness of the young. The female did not spend time objecting at me (she seemed almost over her gun shock); she simply absented herself for considerable periods from the nest, the longest of these being forty-one minutes. In the morning she came to the north entrance each time and left the same way except twice when she slipped out the east opening; in the afternoon she squeezed through the south side once, used the east entrance once and the north twice. The male gave his courting note once.

This was the first day on which the young made themselves conspicuous. Whenever a parent left after feeding there was sure to be one little head at least that waved itself about disappointedly before subsiding. In the morning there was quite a breeze that kept intermittently rocking the juniper branch that held the nest and as continually raising false hopes in three hungry little birds. Eighteen times in the two hours I recorded a jerk by the breeze and the consequent excited heads. In the afternoon one baby was trying to preen its little breast with his eyes half opened, nearly falling over in the attempt. Later one stood up on its feet. At one time all three heads could be seen on the nest rim, whereas before this I could never see the babies except when they stretched up their heads to be fed. At this stage they could hardly be called beautiful from our standpoint as they gaped over the edge of the nest with their enormous red and yellow open bills.

black goggle eyes tight shut and tufts of black down standing pompadour!

On July 13 the female unfortunately seemed to have remembered about the dreadful noise for she spent much of her energy scolding; at times she did not seem much troubled and the rate of *tits* per minute dropped as low as twenty but again they rose to forty-five and fifty a minute. She flirted her wings and tail when chipping vigorously, but preened herself or gathered insects for her lunch when her agitation seemed half forgotten. In the hour and three-quarters that I watched in the morning the male fed eleven times to his mate's three. Once I heard him say *eep, eep*, twice give the courting note and eleven times sing *weechy weech*.

From 6 to 7 P. M. the male again on three occasions quivered his wings and said *kree, kree, kree*, his mate being near him each time. It was hard for her to get sufficient confidence to feed the young, but twice she hurried up after the male had gone to the nest and fed directly after him. She spent some time in the cedar a few feet above me; I seemed to have a sort of horrid fascination for her.

The eighth day was particularly interesting both during the three morning hours of observation and the hour and twenty minutes in the evening. In the first place the nestlings had changed over night from hideous frights to bonny fluffy baby birds. Moreover, the male was in full song again, uttering *weechy weech* 384 times in the morning (singing being recorded during 78 of the 180 minutes) and sixty-one songs in the evening. Another curious thing was the brooding of the young by the female from 8:03 to 8:20 although the temperature was no colder than it had been the day before—62 degrees.

As the little mother sat on the nest she looked the picture of lovely contentment and very pretty with her soft blue grays and bright yellow throat. After a while she moved as if somewhat buffeted by hungry heads but she settled calmly down again with the air of knowing better than her children did what was best for them. The first time that she came to feed she squeezed through the prickly branches to the south and the next time she forced a new entrance to the southwest, but after that she always came and left by the north opening. She spent some energy in chipping at me, but not very strenuously; two minutes that I counted averaged twenty-three *tits* while one had as few as eleven.

Despite the fact of the male's singing so constantly he fed the young eighteen times to his mate's nine. Indeed, he was so busy with both occupations that one minute's record actually stands thus: 9:26—*weechy weech*. Male in cedar with green caterpillar, flies directly to

nest, feeds one young, leaves as usual. *Weechy weech*. Both these songs were uttered as always while he was out of sight. Three times there were evidences of amorousness and once the female responded by quivering her wings, but then flew directly away.

The nestlings were all the time growing more active; they stretched, rearranged themselves, preened their wings and sometimes stood up on their feet. Once they nearly stepped out of the nest in their eagerness to welcome their father. For the first time I heard them give a faint note *zee, zee, zee*.

From 6:20 to 7:40 that evening the young were fed at a more rapid rate than during any other period of observation—once every 3.3 minutes. The female showed no fear at all, always going to and leaving the north opening and hardly saying any *tits* at all. The male sang *sing sweet* three times, *weechy weech* five times, then fifty-three *sing sweets* with a few *sing sing sweets* in between. On the three occasions when the parents were together the male gave his *kree kree* note and his mate always hastened away.

Although the evening before the female had accepted me as harmless, on July 15 her former agitation returned; she protested for half of my morning visit at the rate of twelve to thirty *tits* a minute. However she always entered and left by the north entrance. The male sang only seven *weechy weeches* from 8:30 to 10:00. Part of the time he was searching for insects in sweet fern bushes within a few feet of me, uttering a few *tits* as he did so. He continued his courting of his mate, saying *kree, kree* on four occasions and interestingly enough he was once answered by the female with the same note; immediately afterwards they each fed the young, the male then flying out of sight while the female took up one of her favorite positions, the cedar behind my chair, and started to *tit*.

The young were prettier than ever and more vocal, at one time greeting their father with squeals of welcome.

An hour in the afternoon from 2:10 to 3:10, gave different results from any obtained before; there was no singing, no brooding, no courting and only two meals given and these by the male. The female came once with a caterpillar but must have eaten it herself; she spent thirty-eight of the sixty minutes in scolding. The curious thing was the wide variety of notes employed by her on this occasion, who before, with one small exception of five *eeps*, had confined herself to the most wearisome iteration of *tit*. This time she began with *tits* but all at once introduced a loud *yap* and again an *eep*. One series went like this: *eep, yeep, peep, tit, tit, yap, yeep*—the new notes being deeper and harsher than the old *tit*. Meanwhile the young kept very quiet. The male had come

with food but perhaps was impressed by the female's attitude, for he also ate his caterpillar and began to *tit* at me. She continued *pip, yip, yip, yap, eep*. Later the male fed the young while the female indulged in her everlasting *tit* twenty-five to a minute. The last notes I heard were *yeep, teep, yeep, tit, tit*.

I was unable to visit the nest again until 8:30 the next morning when to my bitter disappointment I found it empty. It may have been that the female's return of her fear of me and her curious new alarm notes had some relationship to the imminency of the young's leaving.

Although I searched and searched I never found the brood nor their mother. The little father I often saw and his singing was heard until July 29. *Sing sweet* was sung appreciably more than *weechy weech*, but both songs were recorded each day until the 23d; after that he only sang *sing sweet*.

#### GENERAL SUMMARY

Data on the nesting behavior of Magnolia Warblers have been given by two writers—Miss Cordelia Stanwood<sup>6</sup> and Mr. Henry Mousley<sup>7</sup>.

The former article is concerned mostly with the structure of nests and nestling plumages; there are several items of interest besides: that in once case the male brought material for the nest, that three of the nests were built in six days, that two different females exhibited the broken wing ruse (one with eggs and the other with young that had left the nest), and finally that one brood left at the age of eight days and two broods at nine or ten days. Mr. Mousley watched two broods of this species, one for two days and the other for some hours each day but one from hatching to the departure of the young. The male of the second brood fed the female on the nest and also ate the faeces—two things my warbler never did. The young left the eighth day instead of the ninth or the tenth as was the case with mine. His warblers resembled mine in several points: his male did not start to feed the young until the second day; no faeces were eaten after the first three days; both of his males showed great variations in the amount of singing, the second bird singing during the first five and on the eighth day but not on the seventh.

A brief summary of some of the aspects of the home life of the birds watched by me will be given.

**BROODING.** For the first four days the female brooded after thirty of her forty-two feedings; after that she was observed to brood

<sup>6</sup>"A Series of Nests of the Magnolia Warbler." *Auk*, XXVII (1910), 384-389.

<sup>7</sup>"A Study of the Home Life of the Northern Parula and Other Warblers at Hatley, Stanstead County, Quebec, 1921-1922." *Auk*, XLI (1924), 263-288.

only twice—on the fifth and eighth days. The male never brooded. There was no sheltering of the young from the sun because it was never necessary. The average number of minutes of each period of brooding was 10.7, almost exactly the same as with Mr. Mousley's Magnolia Warblers—10.5. The percentage of time that the young were brooded in comparison to the time of observation was as follows for the nine days: 19; 56; 33; 45; 3 1-3; 0; 0; 10; 0. (The first day was hot—81 degrees, while the temperature on the others varied between 62 degrees and 76 degrees, except on the afternoon of July 9.)

FEEDING. The parents never gave any note as they approached or left the nest. The food was always visible in the parents' beaks, it was thrust far down into the throat of the nestling, and if not swallowed at once, was removed and given to another. Almost all the food given consisted of green larvae; there were seven round white objects that might have been spiders, and three grasshoppers during the last two days besides a number of miscellaneous insects. Almost without exception, the birds brought only one thing at a time; twice two small caterpillars were noted and once three.

The rate of feeding fluctuated from once every thirty minutes, to once every 3.3 minutes, the average being once every 7.6 minutes; with Mr. Mousley's birds the rate was once every 8.2 and 9.8 minutes. Since there were three young in my nest, and at one-tenth of the visits two young were served, each bird was fed on an average once every twenty minutes during the 26½ hours I watched.

REACTION TO OTHER BIRDS. In general the relations of these warblers with other birds was not unfriendly; no attention was paid to passing Chickadees nor to Chewinks and Maryland Yellow-throats that nested near. The only birds towards whom the male showed animosity were a male Myrtle Warbler that he drove away both during incubation and while the young were in the nest, and the male of his own species who came to call July 2. On July 8 the female warbler gave short shrift to an inquisitive female Black-throated Green Warbler that seemed to wish to inspect the household.

They did not seem to notice the squirrel who several times came within fifteen feet of the nest. The bark of a dog up at the house brought a reaction: on July 9 the mother looked up quickly and panted while on the nest, and July 14 the young stopped their preening on the instant.

As to their human admirer, the male hardly ever seemed to mind me except on two occasions for a short while when my appearance was changed by a different costume. The female objected more than he from the very first; her timidity was increased when I moved véry near

## NESTING ACTIVITIES OF A PAIR OF MAGNOLIA WARBLERS

Date	Time	Hours	Number of times fed by		Average rate of feeding in minutes once in brooded times	Time brooded in minutes	Times faces eaten by		Times faces removed by	Number of songs		Temp.	
			female	male			female	male		female	male		Ww
July 7	9:50-11:22 A.M.	1½	5	0	18	17	?	0	0	0	?	13	81°
July 8	10:45-11:15 A.M.	½	0	1	30	28	?	0	0	0	?	0	72°
July 8	12:30-3:00 P.M.	2½	11	4	10	64	4	0	1	0	141	20	71°
July 8	6:00-7:00 P.M.	1	2	2	15	44	1	0	0	0	102	150	
July 9	8:35-11:05 A.M.	2½	10	9	7.9	65	2	0	2	1	286	0	62°
July 9	2:25-4:25 P.M.	2	5	10	8	47	1	0	0	3	3	0	80°
July 10	12:40-2:10 P.M.	1½	4	6	9	47	0	0	0	1	0	0	68°
July 10	3:42-4:42 P.M.	1	5	4	6.6	21	0	0	3	0	0	0	
July 11	10:13-11:13 A.M.	1	3	5	7.5	2	0	0	2	0	0	0	73°
July 12	9:30-11:30 A.M.	2	7	11	6.6	0	0	0	1	1	0	0	76°
July 12	2:22-3:52 P.M.	1½	4	9	7	0	0	0	1	2	0	0	
July 13	7:36-9:20 A.M.	1¾	3	11	7.5	0	0	0	0	3	11	0	63°
July 13	6:02-7:02 P.M.	1	4	6	6	0	0	0	0	2	0	0	
July 14	7:50-10:50 A.M.	3	9	18	6.6	17	0	0	3	3	384	0	62°
July 14	6:20-7:40 P.M.	1½	13	11	3.3	0	0	0	2	2	5	56	
July 15	8:30-10:00 A.M.	1½	6	9	6	0	0	0	2	2	7	0	62°
July 15	2:10-3:10 P.M.	1	0	2	30	0	0	0	0	1	0	0	
Total		26½	91	118	7.8	352	8	0	17	21	939†	239	

\*Singing *weechy weech* about one-half the time.†Singing *weechy weech* about one-third the time.

‡Not complete.

the nest, when I rose to frighten away the squirrel, and most of all after I had shot the gun.

BEHAVIOR OF THE FEMALE WARBLER. The mother warbler had a most interesting character; her conduct was often hard to explain. She fluctuated between boldness and timidity without any apparent cause. After the squirrel incident, the sight of me often inhibited her impulse to feed, yet after a while her agitation would practically vanish, she would preen herself and collect insects for her own dinner, letting the infants go hungry. She showed considerable ingenuity in her discovery of new methods of entering the nest.

As to her notes, I once heard her give the courting note *kree*, and on two different dates, July 9 and 15, she gave utterance to the loud unmusical *eep* and variations of the same nature. Her favorite expression, however, was the gentle alarm note *tit*; I must have listened to its utterance several thousands of times.

BEHAVIOR OF THE MALE WARBLER. The male seemed to have a more straight forward nature than his mate; the only inexplicable thing about his conduct was his determination to court the female at the very end of this belated nesting cycle. The attention that he paid to his nestlings increased from zero on the first day to moderate interest on the second, equal zeal with his mate on the third day and after that to greater devotion than hers. From the fifth day on he outdid the female in all but one of the nine periods of watching; moreover he fed two nestlings nineteen times in contrast to her three times. He was in full song the first three days, was nearly silent the next four, in full song on the eighth, but hardly sang at all the ninth and tenth.

His songs were two: the day song and perch song *weechy weech* and the feeding and vesper song *sing sweet* with its variation *sing sing sweet*. He used three different notes: *tit* the alarm note, *kree* the love note, and *eep*, the significance of which I never fathomed.

Acquaintance with the personalities of these enchanting little birds was one of the chief rewards of this study—the appreciation of the vagaries of one, the indefatigability in song and devotion to home of the other, and the courage, beauty and charm of both.

NORMAN, OKLAHOMA.